

GEO-11

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Meteorites in New Hampshire

Meteorites are chunks of metallic or stony material that survive their plunge through the Earth's atmosphere and land on the Earth's surface. Intersecting the Earth's orbit and surviving a ride through the atmosphere without being vaporized is a very rare event. While out in space, debris in the solar system is called **meteoroids**. However, they become **meteors** when they enter our atmosphere. Meteoroids are generally the size of a grain of sand, and are quickly vaporized by the heat of friction created as they collide with air molecules of the upper atmosphere. We see this vaporization as a "shooting star," or when several meteors appear seconds or minutes apart we see a "meteor shower."



A meteor that actually lands on Earth's surface is called a **meteorite** and is difficult to identify, especially if you did not actually see the "fall." Those meteoroids that endure the friction of the atmosphere are large enough to survive vaporization. Heating of the outside surfaces causes their surface to "melt" (ablate), giving parts of the surface a smooth molten appearance. However, the inside may still be cold, since out in space their temperature can approach absolute zero (0 = -273 °C) or be over 400 degrees °C if the meteoroid had been orbiting in direct sunlight.

Types of Meteorites:

- **Metallic meteorites** may have enough iron and/or nickel in them to be attracted to a magnet and will be heavy for their size. Sawing off a portion of an iron/nickel metallic meteorite may reveal a cross hatched pattern (called a Widmanstätten pattern). Having cooled slowly over several million years in orbit, the presence of this pattern proves that it is an extraterrestrial object.
- **Stony meteorites** are not magnetic or particularly heavy for their size. They may have what appear to be small "clumps" within the stony mass, which are rounded grains of silicate minerals called **chondrules**.

Why is it so difficult to find meteorites in New Hampshire?

New Hampshire's landscape was greatly altered by multiple glaciations in recent geologic time. Soil layers were scraped away completely in places to expose underlying bedrock, while in other places bedrock was buried under thick layers of stony glacial till or water-sorted deposits of sand and gravel. Any meteorites that might have been lying on or near the land surface before glaciation would have been thoroughly mixed up with all the other rock debris during the advance and retreat of the last glacier. Therefore, finding a meteorite in our rocky soil is much harder than finding one on the relatively "clean" surface of a glacier or sand dune. To complicate matters, New Hampshire's bedrock contains minerals that are magnetic and rocks commonly have been smoothed and polished by glacial ice or by being tumbled in rivers and streams. Also, industrial processes such as iron smelting and glassmaking in more recent times have left behind waste slags that once were in a molten state, and in the former case are also magnetic and feel relatively heavy for their size. Because meteorites are rare to begin with, finding one is like finding the proverbial "needle in a haystack." In fact, to date, there are no confirmed meteorite finds in New Hampshire. However, if you think you've found one, search the web for "Meteorite ID."

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